

Contaminant Accumulation In Fish, Sediments, And The Aquatic Food Chain
Study Plan W2, Phase 1 Draft Report
Oroville Facilities P-2100 Relicensing

Table 5.0-2. Continued.

			Arsenic	Cadmium	Chromium	Copper		Lead	Mercury	Nickel	Selenium	Silver	Zinc
Maximum Tissue Residue Levels (MTRLs) (for Filets or Edible Tissues) (a)	for Carcinogens in Inland Surface Waters		0.2										
	for Non-carcinogens in Inland Surface Waters			0.64					1	28			
NAS Recommended Guideline for Freshwater Fish (b)	(Whole Fish)								0.5				
FDA Action Level for Freshwater and Marine Fish (c)	(Edible Portion)								1.0 (d)				
OEHHA Screening values and action levels in fish tissues (e)	USEPA Value		3 (f)	10					0.6 (g)		50		
	OEHHA Value		1 (f)	3					0.3 (g,n)		20		
Elevated Data Levels (a)	Fish Type (h)		All	All	All	Non	Salmo	All	All	All	All	All	All
	Fish Livers	EDL 85	0.21	0.36	0.03	12	170	0.1	ID (j)	<0.10 (i)	3.32	0.26	28
		EDL 95	0.68	0.99	0.07	33	230	0.2	ID	0.2	4.74	0.76	38
	Whole Fish	EDL 85	0.41	0.12	0.23	3.3	0.2	0.11	0.21	1.4	0.02	42	
		EDL 95	0.88	0.19	0.54	4.3	0.46	0.22	0.56	1.9	0.04	49	
	Fish Filets	EDL 85	0.14	<0.01 (i)	<0.02 (i)	0.69	<0.10 (i)	0.8	<0.10 (i)	1	<0.02 (i)	21.4	
		EDL 95	0.43	0.01	<0.02 (i)	0.99	<0.10	1.7	<0.10 (i)	1.8	<0.02 (i)	30.2	
Median International Standards (a)	(excludes liver)		1.5	0.3	1	20		2	0.5		2		45
Canadian Tissue Residue guidelines									0.033 (y)				
			NA (z) (USFWS 1988b)	0.1 (USFWS 1985a)	NA (z) (USFWS 1986b)	NA (z) (USFWS 1998a)	NA (z) (USFWS 1988c)	wildlife: 1.1, avian: 0.1 (USFWS 1987)	wildlife:500; avian: 200 (USFWS1998b)	NA (z) (USFWS 1985b)	6 (USFWS 1996)	300 (z) (USFWS 1993)	
USFWS Contaminant Hazard Reviews													
USFWS protection of threatened and endangered wildlife									0.3 (aa)				
Station Name	Species (k)	Type	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc	
Feather R US from Afterbay Outlet	LMB	flesh	0.039	<0.002	0.09 (u)	0.26	<0.002	0.475 (s,bb,cc,dd)	0.016	0.16	<0.002	4.45	
Feather R US from Afterbay Outlet	LMB	liver	0.113	0.058	0.109 (t)	1.68	0.003	0.215	0.022	0.63	<0.002	17.4	
Feather R DS from Afterbay Outlet	LMB	liver			0.22 (t)	9.23	<.002				<.002	18.0	
Feather R DS from Afterbay Outlet	LMB	flesh	0.050	<.002				0.542 (s,w,bb,cc,dd)	<.002	0.20			
Mile Long Pond	BRB	flesh	<0.025	<0.002	0.126 (u)	0.32	<0.002	0.062	0.004	0.04	<0.002	3.85	
Mile Long Pond	BRB	liver	<0.025	<0.002	0.111 (t)	2.08	0.008	0.005	0.14 (t)	0.16	0.005	9.23	
Potters Pond	CP	flesh	0.060	0.004				0.133 (bb,dd)	0.009	0.18			
Potters Pond	LMB	liver			0.19 (t)	3.53	0.008				<.002	19.0	
Potters Pond	LMB	liver			0.23 (t)	3.47	0.004				<.002	18.2	
Potters Pond	LMB	flesh	<0.025	<.002				0.26 (bb,dd)	0.123 (u)	0.12			
Lower Pacific Heights Pond	CHC	liver			0.06 (t)	2.05	0.034				0.003	21.0	
Lower Pacific Heights Pond	CHC	flesh	<0.025	<.002				0.355 (s,bb,cc,dd)	0.006	0.10			
Diversion Pool	crayfish (l)	crayfish			0.25 (v)	20.3 (v,w)	0.012	0.0325 (dd)			0.006	19.7	
N. Afterbay	crayfish (l)	crayfish			0.25 (v)	34.3 (v,w)	0.023	0.022/0.0249			0.011	19.8	
S. Afterbay	crayfish (l)	crayfish			0.32 (v)	27.6 (v,w)	0.035	0.0263			0.010	23.0	
Feather R DS Hwy 70	crayfish (l)	crayfish			0.26 (v)	22.2 (v,w)	0.025	0.0416 (dd)			0.016	22.5	

Preliminary Information – Subject to Revision – For Collaborative Process Purposes Only

5.1.2.6 Mercury

Fish composites exceeded the OEHHA screening value or USEPA criterion for protection of human health for mercury in filets from every sampling site except Mile Long and Potter's ponds. Highest levels of mercury in fish filets, which exceeded the MTRL, were found in the lower South Fork and Middle Fork arms of Lake Oroville. The EDL was exceeded in fish from both sampling sites in the South Fork, lower Middle Fork, and Bidwell arms of Lake Oroville, while the MIS was exceeded in both of the South Fork and Middle Fork, the Foreman Creek area of the North Fork, and the Bidwell arms of Lake Oroville, the North Thermalito Forebay swim area, and the Feather River downstream from the Afterbay Outlet. Both the Canadian tissue (EC 2000) and USFWS (1987) guidelines for protection of wildlife from ingesting contaminated prey were exceeded at all stations except Mile Long Pong. The USFWS recommendation for protection of wildlife from methylmercury ingested from prey (USFWS 2003) was exceeded in fish from all sampling sites except Mile Long and Potter's ponds. Mercury levels in crayfish composites from the Diversion Pool and Feather River downstream from Highway 70 were at or exceeded the Canadian tissue residue guideline. However, total mercury was analyzed from the crayfish, while the guideline is for methylmercury. While the total mercury in fish is assumed to represent methylmercury, sufficient analyses are not available to determine if a similar relationship exists in crayfish.

Analyses of mercury from individual fish show the OEHHA screening value and USEPA criterion for protection of human health was exceeded at most sampling sites, as was the recommendation of the USFWS for protection of threatened and endangered wildlife (Figure 5.1.2-1). Most fish from the Thermalito Afterbay, which was sampled in the area of the ski cove and Potter's Pond, had levels of mercury that were less than the screening value, health criterion, and protection guideline.

Mercury has no known beneficial biological function, and can be bioconcentrated in organisms and biomagnified through the food web (USFWS 1987). Mercury is a mutagen, teratogen, and carcinogen, and causes embryocidal, cytochemical, and histopathological effects. Earlier studies have indicated that total mercury concentrations in prey items for the protection of sensitive species of mammals and birds that regularly consume fish and other aquatic organisms should not exceed 0.1 mg/kg fresh weight for birds and 1.1 mg/kg for small mammals. Criteria for methylmercury in fish of 0.3 mg/kg have been developed for protection of human health (USEPA 2001). The USEPA, in consultation with the USFWS, concluded that this criterion should also be protective of federally listed aquatic and aquatic dependent wildlife species in California (USFWS 2003). However, evaluation of this criterion indicates that certain species may be protected, depending upon which trophic level analysis approach is used, but that others are still susceptible to adverse effects at concentrations of mercury less than the criterion.